## CLAIMS

We claim:

1. A magnetic recording media, comprising:

a first stack comprising a plurality of repetitions of first magnetic layers interleaved with first nonmagnetic layers, wherein said first stack has a first Curie temperature and a first magneto-crystalline anisotropy; and

a second stack comprising a plurality of repetitions of second magnetic layers interleaved with second nonmagnetic layers, said second stack in laminar contact with said first stack, and wherein said second stack has a second Curie temperature greater than said first Curie temperature and said second stack has a second magneto-crystalline anisotropy having a magnitude smaller than said first magneto-crystalline anisotropy.

2. The magnetic recording media recited in claim 1, wherein said first magnetic layers are made of cobalt.

3. The magnetic recording media recited in claim 1, wherein said first magnetic layers are chosen from a group of materials consisting of Co, Co-Pt-Cr-B, Co-Pt-Cr, Co-Cr, Cr-Pt-Cr-Nb, Co-Pd-Cr-Nb, Co-Pd-Cr-B and Co-Pd-Cr.

4. The magnetic recording media recited in claim 3, wherein said first magnetic layers have a thickness in the range of 1-8 Å.

5. The magnetic recording media recited in claim 1, wherein said first nonmagnetic layers are made of platinum or palladium.

6. The magnetic recording media recited in claim 5, wherein said first nonmagnetic layers have a thickness in the range of 1-25 Å.

7. The magnetic recording media recited in claim 1, wherein said second magnetic layers are made of cobalt.

8. The magnetic recording media recited in claim 1, wherein said second magnetic layers are chosen from a group of materials consisting of Co, Co-Pt-Cr-B, Co-Pt-Cr, Co-Cr, Cr-Pt-Cr-Nb, Co-Pd-Cr-Nb, Co-Pd-Cr-B and Co-Pd-Cr.

9. The magnetic recording media recited in claim 8, wherein said second magnetic layers have a thickness in the range of 10-50 Å.

10. The magnetic recording media recited in claim 1, wherein said second nonmagnetic layers are made of platinum or palladium.

11. The magnetic recording media recited in claim 10, wherein said second nonmagnetic layers have a thickness in the range of 1-25 Å.

12. The magnetic recording media recited in claim 1, wherein said plurality of repetitions of first magnetic layers interleaved with first nonmagnetic layers is in the range of 4-15.

13. The magnetic recording media recited in claim 1, wherein said plurality of repetitions of second magnetic layers interleaved with second nonmagnetic layers is in the range of 1-4.

14. The magnetic recording media recited in claim 1, wherein the first Curie temperature of the first stack is in the range of 100-350 °C lower than the second Curie temperature of the second stack.

15. A magnetic recording media, comprising:

a first magnetic layer made of a granular $L1_0$ phase of Fe-Pt or Co-Pt alloys, wherein said first magnetic layer has a first Curie temperature and a first magneto-crystalline anisotropy; and

a second magnetic layer made of Co-Pt or Co-Pd alloys, said second magnetic layer in laminar contact with said first magnetic layer, and wherein said second magnetic layer has a second Curie temperature greater than said first Curie temperature and said second magnetic layer has a second magneto-crystalline anisotropy having a magnitude smaller than said first magneto-crystalline anisotropy.

16. The magnetic recording media recited in claim 15, wherein said first magnetic layer is made of Fe-Pt-Ni.

17. The magnetic recording media recited in claim 15, wherein the first magnetic layer has a thickness of about 60 Å.

18. The magnetic recording media recited in claim 15, wherein the second magnetic layer is made of Co-Pt-Cr.

19. The magnetic recording media recited in claim 15, wherein the second magnetic layer has a thickness of about 20 Å.

20. The magnetic recording media recited in claim 15, wherein the second Curie temperature is in the range of 100-350 °C higher than the first Curie temperature.

21. A magnetic recording media, comprising:

a first magnetic layer made of a granular $L1_0$ phase of Fe-Pt or Co-Pt alloys, wherein said first magnetic layer has a first Curie temperature and a first magneto-crystalline anisotropy; and

a stack comprising a plurality of repetitions of second magnetic layers interleaved with nonmagnetic layers, said stack in laminar contact with said first magnetic layer, wherein said stack has a second Curie temperature greater than said first Curie temperature and wherein said stack has a second magneto-crystalline anisotropy smaller than said first magneto-crystalline anisotropy.

22. The magnetic recording media recited in claim 21, wherein the first magnetic layer is made of Fe-Pt-Ni.

23. The magnetic recording media recited in claim 21, wherein the first magnetic layer has a thickness of about 60 Å.

24. The magnetic recording media recited in claim 21, wherein said second magnetic layers are made of cobalt.

25. The magnetic recording media recited in claim 21, wherein said second magnetic layers are chosen from a group of materials consisting of Co, Co-Pt-Cr-B, Co-Pt-Cr, Co-Cr, Cr-Pt-Cr-Nb, Co-Pd-Cr-Nb, Co-Pd-Cr-B and Co-Pd-Cr.

26. The magnetic recording media recited in claim 21, wherein said second magnetic layers have a thickness in the range of 10-50 Å.

27. The magnetic recording media recited in claim 21, wherein said nonmagnetic layers are made of platinum or palladium.

28. The magnetic recording media recited in claim 21, wherein said nonmagnetic layers have a thickness in the range of 1-25 Å.

29. The magnetic recording media recited in claim 21, wherein said plurality of repetitions of second magnetic layers interleaved with nonmagnetic layers is in the range of 1-4.

30. The magnetic recording media recited in claim 21, wherein the first Curie temperature of the first magnetic layer is in the range of 100-350 °C lower than the second Curie temperature of the stack.

31. A magnetic recording media, comprising:

a first magnetic layer having a first magneto-crystalline anisotropy and a first Curie temperature; and

a second magnetic layer having a second magneto-crystalline anisotropy and a second Curie temperature, wherein said second magneto-crystalline anisotropy is smaller than said first magneto-crystalline anisotropy and said second Curie temperature is greater than said first Curie temperature, and wherein said second magnetic layer is in laminar contact with said first magnetic layer.

32. The magnetic recording media as recited in claim 31, wherein said first magnetic layer is made of Fe-Pt-Ni.

33. The magnetic recording media as recited in claim 31, wherein said first magnetic layer has a thickness in the range of 60 Å.

34. The magnetic recording media as recited in claim 31, wherein said second magnetic layer is made of Co-Pt-Cr.

35. The magnetic recording media as recited in claim 31, wherein said second magnetic layer has a thickness of about 20 Å.

36. The magnetic recording media as recited in claim 31, wherein said first magnetic layer is chosen from a group of materials consisting of Fe-Pt, Co-Pt and Co-Pd.

37. The magnetic recording media as recited in claim 31, wherein said second magnetic layer is chosen from a group of materials consisting of Co-Pt, Co-Pt-Cr, Co-Pt-Cr-Nb, Co-Pt-Cr-B, Co-Pd, Co-Pd-Cr, Co-Pd-Cr-Nb and Co-Pd-Cr-B.

38. The magnetic recording media recited in claim 31, wherein the first Curie temperature of the first magnetic layer is in the range of 100-350 °C lower than the second Curie temperature of the second magnetic layer.

39. A magnetic recording media, comprising:

a layer means for providing a first stack in laminar contact with a second stack, wherein said first stack has a first magnetocrystalline anisotropy greater than a second magnetocrystalline anisotropy of said second stack; and

wherein said first stack has a first Curie temperature smaller than a second Curie temperature of said second stack.

40. The magnetic recording media recited in claim 39, wherein the first Curie temperature of the first stack is in the range of 100-350 °C lower than the second Curie temperature of the second stack.

41. A magnetic recording media, comprising:

a layer means for providing a first stack having a first Curie temperature and a first magneto-crystalline anisotropy;

a layer means for providing a second stack having a second Curie temperature larger than the first Curie temperature and a second magneto-crystalline anisotropy having a magnitude smaller than the first magneto-crystalline anisotropy; and

a spacer layer disposed between the first stack and the second stack.

42. The magnetic recording media recited in claim 41, wherein the first Curie temperature of the first stack is in the range of 100-350 °C lower than the second Curie temperature of the second stack.

43. A magnetic recording disk comprising:

a substrate;

an underlayer adjacent to the substrate;

an overlayer; and

a magnetic recording media disposed between the underlayer and the overlayer, said magnetic recording media comprising:

a first stack comprising a plurality of repetitions of first magnetic layers interleaved with first nonmagnetic layers, wherein said first stack has a

first Curie temperature and a first magneto-crystalline anisotropy; and

a second stack comprising a plurality of repetitions of second magnetic layers interleaved with second nonmagnetic layers, said second stack in laminar contact with said first stack, and wherein said second stack has a second Curie temperature greater than said first Curie temperature and said second stack has a second magneto-crystalline anisotropy having a magnitude smaller than said first magneto-crystalline anisotropy.

44. The magnetic recording disk recited in claim 43, wherein said first magnetic layers are chosen from a group of materials consisting of Co, Co-Pt-Cr-B, Co-Pt-Cr, Co-Cr, Cr-Pt-Cr-Nb, Co-Pd-Cr-Nb, Co-Pd-Cr-B and Co-Pd-Cr.

45. The magnetic recording disk recited in claim 43, wherein said second magnetic layers are chosen from a group of materials consisting of Co, Co-Pt-Cr-B, Co-Pt-Cr, Co-Cr, Cr-Pt-Cr-Nb, Co-Pd-Cr-Nb, Co-Pd-Cr-B and Co-Pd-Cr.

46. The magnetic recording disk recited in claim 43, wherein said first nonmagnetic layers are made of platinum or palladium.

47. The magnetic recording disk recited in claim 43, wherein said second nonmagnetic layers are made of platinum or palladium.

48. A magnetic recording disk comprising:

a substrate;

an underlayer adjacent to the substrate;

an overlayer; and

a magnetic recording media disposed between the underlayer and the overlayer, said magnetic recording media comprising:

a first magnetic layer made of a granular $L1_0$ phase of Fe-Pt or Co-Pt alloys, wherein said first magnetic layer has a first Curie temperature and a first magneto-crystalline anisotropy; and

a second magnetic layer made of Co-Pt or Co-Pd alloys, said second magnetic layer in laminar contact with said first magnetic layer, and wherein said second magnetic layer has a second Curie temperature greater than said first Curie temperature and said second magnetic layer has a second magneto-crystalline anisotropy having a magnitude smaller than said first magneto-crystalline anisotropy.

49. The magnetic recording disk recited in claim 48, wherein said first magnetic layer is made of Fe-Pt-Ni.

50. The magnetic recording disk recited in claim 48, wherein the second magnetic layer is made of Co-Pt-Cr.

51. A magnetic recording disk comprising:

a substrate;

an underlayer adjacent to the substrate;

an overlayer; and

a magnetic recording media disposed between the underlayer and the overlayer, said magnetic recording media comprising:

a first magnetic layer made of a granular $L1_0$ phase of Fe-Pt or Co-Pt alloys, wherein said first magnetic layer has a first Curie temperature and a first magneto-crystalline anisotropy; and

a stack comprising a plurality of repetitions of second magnetic layers interleaved with nonmagnetic layers, said stack in laminar contact with said first magnetic layer, wherein said stack has a second Curie temperature greater than said first Curie temperature and wherein said stack has a second magneto-crystalline anisotropy smaller than said first magneto-crystalline anisotropy.

52. The magnetic recording disk recited in claim 51, wherein the first magnetic layer is made of Fe-Pt-Ni.

53. The magnetic recording disk recited in claim 51, wherein said second magnetic layers are chosen from a group of materials consisting of Co, Co-Pt-Cr-B, Co-Pt-Cr, Co-Cr, Cr-Pt-Cr-Nb, Co-Pd-Cr-Nb, Co-Pd-Cr-B and Co-Pd-Cr.

54. The magnetic recording disk recited in claim 51, wherein said nonmagnetic layers are made of platinum or palladium.

55. A magnetic recording disk comprising:

a substrate;

an underlayer adjacent to the substrate;

an overlayer; and

a magnetic recording media disposed between the underlayer and the overlayer, said magnetic recording media comprising:

a first magnetic layer having a first magneto-crystalline anisotropy and a first Curie temperature; and

a second magnetic layer having a second magneto-crystalline anisotropy and a second Curie temperature, wherein said second magneto-crystalline anisotropy is smaller than said first magneto-crystalline anisotropy and said second Curie temperature is greater than said first Curie temperature, and wherein said second magnetic layer is in laminar contact with said first magnetic layer.

56. The magnetic recording disk as recited in claim 55, wherein said first magnetic layer is chosen from a group of materials consisting of Fe-Pt, Fe-Pt-Ni, Co-Pt and Co-Pd.

57. The magnetic recording disk as recited in claim 55, wherein said second magnetic layer is chosen from a group of materials consisting of Co-Pt, Co-Pt-Cr, Co-Pt-Cr-Nb, Co-Pt-Cr-B Co-Pd, Co-Pd-Cr, Co-Pd-Cr-Nb and Co-Pd-Cr-B.

58. A magnetic recording disk comprising:

a substrate;

an underlayer adjacent to the substrate;

an overlayer; and

a magnetic recording media disposed between the underlayer and the overlayer, said magnetic recording media comprising:

a layer means for providing a first stack in laminar contact with a second stack, wherein said first stack has a first magnetocrystalline anisotropy greater than a second magnetocrystalline anisotropy of said second stack; and

wherein said first stack has a first Curie temperature smaller than a second Curie temperature of said second stack.

59. The magnetic recording disk recited in claim 58, wherein the first Curie temperature of the first stack is in the range of 100-350 °C lower than the second Curie temperature of the second stack.

60. A magnetic recording disk comprising:

a substrate;

an underlayer adjacent to the substrate;

an overlayer; and

a magnetic recording media disposed between the underlayer and the overlayer, said magnetic recording media comprising:

a layer means for providing a first stack having a first Curie temperature and a first magneto-crystalline anisotropy;

a layer means for providing a second stack having a second Curie temperature larger than the first Curie temperature and a second magneto-crystalline anisotropy having a magnitude smaller than the first magneto-crystalline anisotropy; and

a spacer layer disposed between the first stack and the second stack.

61. The magnetic recording disk recited in claim 60, wherein the first Curie temperature of the first stack is in the range of

100-350 °C lower than the second Curie temperature of the second stack.

62. A disk drive system, comprising:

a magnetic recording disk including:

a substrate;

an underlayer adjacent to the substrate;

an overlayer; and

a magnetic recording media disposed between the underlayer and the overlayer, said magnetic recording media comprising:

a first stack comprising a plurality of repetitions of first magnetic layers interleaved with first nonmagnetic layers, wherein said first stack has a first Curie temperature and a first magneto-crystalline anisotropy; and

a second stack comprising a plurality of repetitions of second magnetic layers interleaved with second nonmagnetic layers, said second stack in laminar contact with said first stack, and wherein said second stack has a second Curie temperature greater than said first Curie temperature and said second stack has a second magneto-crystalline anisotropy having a

magnitude smaller than said first magneto-crystalline anisotropy;

a magnetic read/write head for magnetically recording data on the magnetic recording disk;

an actuator for moving said read/write head across the magnetic disk so that the read/write head may access different regions of the magnetic recording disk; and

a recording channel coupled electrically to the write head for magnetically recording data on the magnetic recording disk and to the magnetoresistive sensor of the read head for detecting changes in the resistance of the magnetoresistive sensor in response to magnetic fields from the magnetically recorded data.

63. The disk drive system recited in claim 62, wherein said first magnetic layers are chosen from a group of materials consisting of Co, Co-Pt-Cr-B, Co-Pt-Cr, Co-Cr, Cr-Pt-Cr-Nb, Co-Pd-Cr-Nb, Co-Pd-Cr-B and Co-Pd-Cr.

64. The disk drive system recited in claim 62, wherein said second magnetic layers are chosen from a group of materials consisting of Co, Co-Pt-Cr-B, Co-Pt-Cr, Co-Cr, Cr-Pt-Cr-Nb, Co-Pd-Cr-Nb, Co-Pd-Cr-B and Co-Pd-Cr.

65. The disk drive system recited in claim 62, wherein said first nonmagnetic layers are made of platinum or palladium.

66. The disk drive system recited in claim 62, wherein said second nonmagnetic layers are made of platinum or palladium.

67. A disk drive system, comprising:

a magnetic recording disk including:

a substrate;

an underlayer adjacent to the substrate;

an overlayer; and

a magnetic recording media disposed between the underlayer and the overlayer, said magnetic recording media comprising:

a first magnetic layer made of a granular $L1_0$ phase of Fe-Pt or Co-Pt alloys, wherein said first magnetic layer has a first Curie temperature and a first magneto-crystalline anisotropy; and

a second magnetic layer made of Co-Pt or Co-Pd alloys, said second magnetic layer in laminar contact with said first magnetic layer, and wherein said second magnetic layer has a second Curie temperature greater than said first Curie temperature and said second magnetic layer has a second magneto-crystalline anisotropy having a

magnitude smaller than said first magneto-crystalline anisotropy;

a magnetic read/write head for magnetically recording data on the magnetic recording disk;

an actuator for moving said read/write head across the magnetic disk so that the read/write head may access different regions of the magnetic recording disk; and

a recording channel coupled electrically to the write head for magnetically recording data on the magnetic recording disk and to the magnetoresistive sensor of the read head for detecting changes in the resistance of the magnetoresistive sensor in response to magnetic fields from the magnetically recorded data.

68. The disk drive system recited in claim 67, wherein said first magnetic layer is made of Fe-Pt-Ni.

69. The disk drive system recited in claim 67, wherein the second magnetic layer is made of Co-Pt-Cr.

70. A disk drive system, comprising:

a magnetic recording disk including:

a substrate;

an underlayer adjacent to the substrate;

an overlayer; and

a magnetic recording media disposed between the underlayer and the overlayer, said magnetic recording media comprising:

a first magnetic layer made of a granular $L1_0$ phase of Fe-Pt or Co-Pt alloys, wherein said first magnetic layer has a first Curie temperature and a first magneto-crystalline anisotropy; and

a stack comprising a plurality of repetitions of second magnetic layers interleaved with nonmagnetic layers, said stack in laminar contact with said first magnetic layer, wherein said stack has a second Curie temperature greater than said first Curie temperature and wherein said stack has a second magneto-crystalline anisotropy smaller than said first magneto-crystalline anisotropy;

a magnetic read/write head for magnetically recording data on the magnetic recording disk;

an actuator for moving said read/write head across the magnetic disk so that the read/write head may access different regions of the magnetic recording disk; and

a recording channel coupled electrically to the write head for magnetically recording data on the magnetic recording disk and to the magnetoresistive sensor of the read head for detecting

changes in the resistance of the magnetoresistive sensor in response to magnetic fields from the magnetically recorded data.

71. The disk drive system recited in claim 70, wherein the first magnetic layer is made of Fe-Pt-Ni.

72. The disk drive system recited in claim 70, wherein said second magnetic layers are chosen from a group of materials consisting of Co, Co-Pt-Cr-B, Co-Pt-Cr, Co-Cr, Cr-Pt-Cr-Nb, Co-Pd-Cr-Nb, Co-Pd-Cr-B and Co-Pd-Cr.

73. The disk drive system recited in claim 70, wherein said nonmagnetic layers are made of platinum or palladium.

74. A disk drive system, comprising:

a magnetic recording disk including:

a substrate;

an underlayer adjacent to the substrate;

an overlayer; and

a magnetic recording media disposed between the underlayer and the overlayer, said magnetic recording media comprising:

a first magnetic layer having a first magneto-crystalline anisotropy and a first Curie temperature; and

a second magnetic layer having a second magneto-crystalline anisotropy and a second Curie temperature, wherein said second magneto-crystalline anisotropy is smaller than said first magneto-crystalline anisotropy and said second Curie temperature is greater than said first Curie temperature, and wherein said second magnetic layer is in laminar contact with said first magnetic layer;

a magnetic read/write head for magnetically recording data on the magnetic recording disk;

an actuator for moving said read/write head across the magnetic disk so that the read/write head may access different regions of the magnetic recording disk; and

a recording channel coupled electrically to the write head for magnetically recording data on the magnetic recording disk and to the magnetoresistive sensor of the read head for detecting changes in the resistance of the magnetoresistive sensor in response to magnetic fields from the magnetically recorded data.

75. The disk drive system as recited in claim 74, wherein said first magnetic layer is chosen from a group of materials consisting of Fe-Pt, Fe-Pt-Ni, Co-Pt and Co-Pd.

76. The disk drive system as recited in claim 74, wherein said second magnetic layer is chosen from a group of materials consisting of Co-Pt, Co-Pt-Cr, Co-Pt-Cr-Nb, Co-Pt-Cr-B, Co-Pd, Co-Pd-Cr, Co-Pd-Cr-Nb and Co-Pd-Cr-B.

77. A disk drive system, comprising:

a magnetic recording disk including:

a substrate;

an underlayer adjacent to the substrate;

an overlayer; and

a magnetic recording media disposed between the underlayer and the overlayer, said magnetic recording media comprising:

a layer means for providing a first stack in laminar contact with a second stack, wherein said first stack has a first magnetocrystalline anisotropy greater than a second magnetocrystalline anisotropy of said second stack; and

wherein said first stack has a first Curie temperature smaller than a second Curie temperature of said second stack;

a magnetic read/write head for magnetically recording data on the magnetic recording disk;

an actuator for moving said read/write head across the magnetic disk so that the read/write head may access different regions of the magnetic recording disk; and

a recording channel coupled electrically to the write head for magnetically recording data on the magnetic recording disk and to the magnetoresistive sensor of the read head for detecting changes in the resistance of the magnetoresistive sensor in response to magnetic fields from the magnetically recorded data.

78. A disk drive system, comprising:

a magnetic recording disk including:

a substrate;

an underlayer adjacent to the substrate;

an overlayer; and

a magnetic recording media disposed between the underlayer and the overlayer, said magnetic recording media comprising:

a layer means for providing a first stack having a first Curie temperature and a first magneto-crystalline anisotropy;

a layer means for providing a second stack having a second Curie temperature larger than the first Curie temperature and a second magneto-crystalline anisotropy having a

magnitude smaller than the first magneto-crystalline anisotropy; and

a spacer layer disposed between the first stack and the second stack;

a magnetic read/write head for magnetically recording data on the magnetic recording disk;

an actuator for moving said read/write head across the magnetic disk so that the read/write head may access different regions of the magnetic recording disk; and

a recording channel coupled electrically to the write head for magnetically recording data on the magnetic recording disk and to the magnetoresistive sensor of the read head for detecting changes in the resistance of the magnetoresistive sensor in response to magnetic fields from the magnetically recorded data.